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## ORGANISM AND ENVIRONMENT.

*Organism and Environment as illustrated by the Physiology of Breathing.* By Dr. J. S. Haldane. Pp. xi+138. (New Haven: Yale University Press; London: Oxford University Press, 1917.) Price 5*s*. 6*d*. net.

DR. HALDANE'S book is a record of four public lectures delivered by him under the Silliman Trust at Yale University in 1916. In the short compass of little more than a hundred pages the author gives an admirable account of the physiology of breathing, based mainly on the researches of himself and his pupils, which have played so great a part in moulding our present ideas on the subject.

The special value of the book to students lies in the fact that the function of respiration is treated simply as one aspect of the activities of the organism as a whole, as a chapter in the unending series of adaptations, internal and external, which make up the life of an individual. There is a real danger that, in the detailed analytical study of isolated phenomena and functions which the student meets with in successive chapters of any text-book of physiology, he may lose sight of the essential unity of all the phenomena presented by a living organism.

The first lecture is devoted to the regulation of respiration and the part played therein by chemical and nervous factors. The second treats of the readjustments of regulation in acclimatisation and disease. After a description of the method in which the hydrogen-ion concentration of the blood is regulated and the effects on the organism of alterations in oxygen-tension, an account is given of the Pike's Peak experiments. It will be remembered that these experiments led to the conclusion that under such conditions of stress as are met with at high altitudes, where there is a chronic deficiency of oxygen, the taking up of this gas by the blood is enhanced by the activity of the epithelium of the lung alveoli, which transfers the gas to the blood at a higher tension than it possesses in the alveolar air. On these experiments many physiologists are inclined to reserve judgment until they have been confirmed and controlled by the use of different methods, especially in view of the fact that earlier experiments, which seemed to show the same active intervention of the alveolar epithelium at normal oxygen-tension, have been disproved by Dr. Haldane himself. It is suggested that these earlier results were obtained when the experimenters were in a condition of chronic CO poisoning, so that their alveolar epithelium had undergone the same acclimatisation as would be evoked by a stay of some duration at high altitudes.

The third lecture deals with the regulation of the environment, internal and external. It is pointed out that "the gross regulation of the circulation is of such a nature as to keep the venous gas-pressures nearly steady, while regulation of breathing keeps the arterial gas-pressures nearly steady." Emphasis is laid on the fact that, in the regulation of the blood-flow, as of the respiration, the determining factor is the metabolic activity of the body as a whole.

In the fourth lecture, which is entitled "Organic Regulation as the Essence of Life: Inadequacy of Mechanistic and Vitalistic Conceptions," the results of the preceding lectures are used as a text from which to expound the author's views as to the methods and aims of physiology. He seems herein to erect dummies, labelled "vitalist" and "mechanist" respectively, for the pleasure later of knocking them down. The reader would gather from this chapter that physiologists were divided into two camps, mechanistic and vitalistic. Is this any more true than the statement, often made by the layman, that the medical world is divided into allopaths and homœopaths? Is there fundamentally any difference in the point of view of physiologists at the present day? All pursue similar methods—the only methods which are open to them—the careful observation of the phenomena of living animals and the average sequence of these phenomena. It is true that one finds among physiologists, as among all other classes of scientific men, the tendency to over-simplify, to fit a new experience into a series which is already familiar, while neglecting details which cannot be so fitted in—an adjustment of facts to curves rather than of curves to facts. But the opposite danger is equally found. Workers, impressed by the seeming impenetrability of the unknown just in front of them, may give up too soon and yield to the temptation of relegating to the arcana of cell-activity processes which further research would have shown to fall within a known category. This faint-hearted attitude might be encouraged by a sentence such as the following: "Those who seek in physiological phenomena for the same kinds of causal explanations as can usually be assigned in connection with inorganic phenomena have no prospect but to remain seeking indefinitely." This prospect is common to all scientific workers, but if the statement implies that no useful results can be obtained in this way, it is not true. We cannot claim to understand or to know fully even the most familiar process in chemistry or physics, and there is no question that further research will considerably modify what are now regarded as fundamental principles—but are really working schemata—in physics and chemistry. The tendency of science is to make its formulæ—its shorthand of phenomenal sequence—more and more wide-embracing. It is a dangerous thing, and savouring of dogma, to set bounds to this development and to assume that the phenomena presented by living beings, as well as those observed in so-called inanimate objects, may not in the future be brought into some one great sequence or natural law.

The fact of consciousness will always remain to remind each of us that all these laws are but

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mental shorthand, invented to increase man's control of his environment and his power to survive in the struggle for existence. We can never pretend that they represent ultimate reality, if such a thing is indeed thinkable. Or does Dr. Haldane believe that there is some great formula which will embrace the worlds of soul and body, and will replace, because including, the concepts which we employ in dealing with the objective world? If this were possible, we should indeed be as gods, and there would seem to remain little place for the last few pages of these lectures, in which the author, in accordance with the wishes of the founders, refers to "the presence of God in the natural and moral world." It is the teaching of biology, as of every religion or State code of ethics, that "we are not mere individuals, but one with a higher reality." No system of education is complete which does not inculcate this as its fundamental doctrine, but it is not given to everyone to make the further inferences drawn by the author of these lectures.

E. H. S.

## *THE PERENNIAL PROBLEM OF DYES.*

*Artificial Dye-stuffs: Their Nature, Manufacture, and Uses.* By A. J. Ramsay and H. Claude Weston. Pp. ix+212. (London: George Routledge and Sons, Ltd., 1917.) Price 3*s*. 6*d*. net.

AFTER a concise historical introduction, the authors deal with the distillation of coal and the manufacture of direct coal-tar products. In referring to the very small yield from coal of the principal colour-producing hydrocarbons, the possibility of a new source of these products from petroleum is mentioned. A more general conversion of coal into coke before consuming it as fuel would also lead to a further supply of these valuable hydrocarbons.

It is an unfortunate feature of this text-book that the chemical foundations are unsound. This detracts considerably from its utility as an introductory manual to the study of the artificial dye industry. The only other *raison d'être* for the work, namely, that of an exhaustive treatise, is disclaimed by the authors.

The azo-group present in the largest class of artificial dyes is defined incorrectly as "a radical consisting of two atoms of nitrogen which can be substituted in a suitable substance for one atom of hydrogen." The consequences of this fundamental error are to be seen in the absurd formula for Bismarck brown on p. 63. The chemical mechanism of the diazo-reaction defined long ago with precision by Griess, the discoverer of the process, is apparently not understood clearly by the authors, who on p. 41 give the formula $C_6H_5.N_2HCl$ to diazobenzene hydrochloride (*sic*). This confusion is continued on p. 42 in the formation of aminoazobenzene. It is only fair to direct attention to these elementary details, because the authors attach importance to them, stating (p. 44) that "if the reader has thoroughly mastered the explanation in the foregoing pages . . . he will be in a position to understand the nature and manufacture of almost any of the series of azo-dyes."

Pyrogallol or "*v*-trihydroxybenzene" is furnished with the structural formula of its isomeride, phloroglucinol. Salicylic acid is stated to be manufactured from anthranilic acid, but this can scarcely be the prevailing method. Confusion rules in regard to "1 : 8 : 4-dioxynaphthalenesulphonic acid," this dihydroxy-derivative of naphthalene being endowed with two atoms of univalent oxygen. Direct or "substantive" dyes are said to be formed within the fibres themselves. Phthalic anhydride is formulated as $C_6H_4(CO_2).O$, but the errant carbon atom returns to the molecule at phthalimide. On p. 111 the words "left" and "right" should replace "top" and "bottom" in the description of the quinonoid hexagon. If this formulation is accepted, it is incorrect to add that the hexagon is linked to chlorine as well as to an amino-group. The formula for *m*-tolylenediamine on p. 133 is incompatible with the constitutions assigned to tolylene red and blue on the same page.

These and other similar chemical errors mar the utility of a text-book which is much more satisfactory in its outline of manufacturing processes, and contains a series of informing diagrams.

G. T. M.

## *THE NEW REGIONALISM.*

*Can We Set the World in Order? The Need for a Constructive World-culture.* By C. R. Enock. Pp. 198. (London: Grant Richards, Ltd. 1916.) Price 3*s*. 6*d*. net.

THE man of fact and the brooding thinker are rarely united in one to form a great leader. Here we have pre-eminently the man of fact. Few pages of this work but evidence the travelled observer richly harvesting facts with admirable zeal for social reconstruction; we therefore warmly recommend his labours to all who would ameliorate the gross and widespread inequalities of human lot.

The author pleads for a "science of human duty in moulding the earth that it may be the home of a high and universal civilisation" (p. 34): truly a lofty ideal. He advocates a co-operative world-survey of economic possibilities, and thereafter the development of a world-order, based upon federated units of industry so organised that every region shall become, so far as geographically possible, an "organism" (p. 41), "self-supplying and self-contained," within "its natural radius of action" (p. 40). A sense of "place-possibility," or "the culture of the locality," should teach us "to regard a place as an organism, capable of being brought to a flourishing and permanent state of life, just as we bring an individual to such a state" (p. 56). To this end, useful "Town-planning" should grow into "Industry-planning" Acts, together culminating in "country-planning," or "the economic consideration and control not only of urban but of rural areas, for . . . in the

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